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**Department of …Statistics & Informatics….**

**College of Administration and Economics**

**University of Salahaddin-Erbil**

**Subject: Multivariate Statistical Analysis with spss**

**Course Book: 4th Year (Senior)**

**Lecturer's name: Mr.Sami Ali Obed (Ms.c)**

**Academic Year: 2022 – 2023 (2nd Semester)**

**Course Book**

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| **1. Course name** | Multivariate Statistical Analysis with SPSS |
| **2. Lecturer in charge** | Mr.Sami Ali Obed |
| **3. Department/ College** | Statistics & Informatics /Adm. & Eco. |
| **4. Contact** | e-mail: **Sami.obed@su.edu.krd**Tel: (optional)  |
| **5. Time (in hours) per week**  | Theory: 2Practical: 2  |
| **6. Office hours** | Monday from 10:30 AM to 2:30 PM (TheoreticalTuesday from 10:30 AM to 1:30 PM (Practical) |
| **7. Course code** |  |
| **8. Teacher's academic profile**  | **I graduated from Salahaddin University – Erbil in 2013  College of Administration & Economics  \ Statistics and Informatics Department  from 2013 to 2016 worked  Assistant Researcher in Statistics and Informatics Department . In 2019 I have earned master's degree in the Department of Statistics and Informatics college of Administration and Economic, University of Salahaddin . I have been teaching in Statistics Department at Salahaddin University since 2020. I have taught (Principle of Statistics, Time Series, Multivariate, Multivariate Analysis with SPSS), and doing researches as well , and, I am working as an assistant teacher in the Department and Informatics of Statistics*** Accountant in Diyari Nishtiman company (from 2018 till now)
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| **9. Keywords** | Multivariate, SPSS, Multiple Correlation Coefficient, Hotelling T2, MANOVA, Factor analysis, cluster analysis, Multiple Regression Analysis, Discriminant Analysis  |
| **10. Course overview:**Most of the observable phenomena in the empirical sciences are of a multivariate nature. In the past 20 years, with the computer application technology and the urgent need for research and production, multivariate statistical analysis techniques are widely used in geology, meteorology, hydrology, medicine, industry, agriculture and economic and many other fields, has become to solve practical problems in effective way. Multivariate statistics refer to an assortment of statistical methods that have been developed to treat situations in which multiple variables are involved. Any analysis of more than two variables can loosely be considered a multivariate statistical analysis.So, how can we introduce our students to big data sets and basic techniques for multivariate data analysis when those students have little background in big data or multivariable manipulations using SPSS package? This course will try to answer this question and teach students the most important methods of multivariate data analyses using computer software, such as multivariate normal distribution, multiple correlation coefficient, MANOVA, Factor Analysis, etc.  |
| **11. Course objective:**The following are the most important objectives of this course: 1. To teach the intermediate level student how to use SPSS for multivariate statistical analysis.
2. To gain a thorough understanding of the details of various multivariate techniques, their purposes, their assumptions, their limitations, etc.
3. To be able to interpret the results of a computer analysis of a multivariate data set using SPSS Package (v.26).
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| **12. Student's obligation** Students are expected to:* Follow university policies when attending class and lab, and taking sudden quizzes and exams.
* Student should be proud of the work that he/she do in this class. Do not allow someone else to copy your homework and do not provide answers to quizzes or tests. If this does occur, credit will be lost and a referral will be written.
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| **13. Forms of teaching**We will focus on some forms of teaching such as classical teaching with whiteboard, PowerPoint presentations for the head titles, definitions and summary of conclusions, classification of materials and any other illustrations, solving the examples by sharing the students to get them will understand, and students should participate as much as possible in lecture’s discussions.  |
| **14. Assessment scheme**The students are obliged to perform at least one closed book exams during the academic semester. The exam has approximately 25%, besides practical exam – 25%. The other 50% will be reserved for the final exam. Therefore, the final grade will be based upon the following criteria:Practical exam: 25% Theoretical exam: 25% Final Practical Exam: 25% Final Theoretical Exam: 25%Total: 100% |
| **15. Student learning outcome:**After the completion of this course in this academic semester, the students will be able to do the following:* Appreciate the range of multivariate techniques available using SPSS;
* Summarize and interpret multivariate data using SPSS;
* Understanding of the link between multivariate techniques and corresponding univariate techniques using SPSS;
* Using multivariate techniques appropriately, undertake multivariate hypothesis tests, and draw appropriate conclusions depending on SPSS results.
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| **16. Course Reading List and References‌:**1. Afifi, Abdelmonen et al. (2020). Practical Multivariate Analysis (6th ed.). Taylor & Francis Group.
2. Daniel J. Denis (2019). *SPSS data analysis for univariate, bivariate, and multivariate statistics*. NJ: Wiley.
3. Cleff, Thomas (2019). Applied Statistics and Multivariate Data Analysis for Business and Economics. Springer.
4. Keenan A. Pituch & James P. Stevens (2016). *Applied Multivariate Statistics for the Social Sciences: Analyses with SAS and IBM's SPSS (6th ed.).* Routledge *.*
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| **17. The Topics:** | **Lecturer's name** |
| The following topics will be covered using SPSS software:1. Matrices and Linear Algebra.
2. Variance-Covariance Matrix (Random Vectors, means, variance and Covariance Standard Scores matrix)
3. Correlation matrix (Simple Linear Correlation, Partial Correlation, Multiple Correlation)
4. Test of Correlation (Test for Population Correlation Coefficient equals Zero, Test for Population Correlation Coefficient equals a specified value, Test for Population Partial Correlation Coefficient, Test for Equality of two Population Correlation Coefficients, Test for Multiple Correlation Coefficient)
5. Eigen values and Eigen Vector
6. Characteristic equation (Properties of Eigen values and Eigen Vector)
7. Quadratic Form (Quadratic Form in n multivariate, Classification of matrix, Some Properties of Quadratic Form for Symmetric matrix)
8. Multivariate Normal distribution (Generalized Univariate Normal distribution, Bivariate normal distribution, Multivariate Normal distribution, Properties of Multivariate Normal random variables)
9. Test for population Mean Vectors (Test for population Mean Vectors (Covariance Matrix Unknown), Test for Equality of Population Means vectors (Covariance Matrices are Equal and known), Test for Equality of Population Means vectors (Covariance Matrices are Equal and Unknown), Test for Equality of Population Means vectors (Covariance Matrices are Unequal and Unknown)
10. Hypothesis Tests for Covariance matrix (Hypothesis Test for Single Covariance matrix, Tests Comparing Covariance Matrices)
11. Principle Components Analysis
12. Discriminate Analysis (Description of Group Separation, The Discriminate Function for Two Groups, Relationship between Two-Group Discriminate Analysis and Multiple Regression, Discriminate Analysis for Several Groups, Discriminate Functions, A Measure of Association for Discriminate Functions)
13. Multivariate Regression (Least Squares Estimation in the Fixed-x Model, The Model Corrected for Means, Subset Selection)
 | Dr. Delshad BotaniMr. Sami AliThree hours a week |
| **18. Practical Topics (If there is any)** |
| The same topics as presented in 17. |
| **19. Examinations:**1. **Compositional:** This type of exams usually starts with define, Explain How, What are the reasons for…?, Why…?, How….? With their typical answers. The following questions are some examples of this kind of examinations:
2. **Fill the blanks:** This type of question or phrase with one or more words replaced with a blank line, giving the student the chance to add the missing word(s), such as the following questions:
3. **True or false type of exams:** In this type of exam, a short sentence about a specific subject will be provided, and then students will comment on the trueness or falseness of this particular sentence, such as the following questions:
4. **Multiple choices:** In this type of exam there will be a number of phrases next or below a statement, students will match the correct phrase, such as the following questions:
5. **Proofs and solutions:** Any proofs or solutions for practical questions may be provided in the exam and students should solve those questions or proof those theorems that are given at daily lectures (It is possible to solve this type of questions in any way), such as the following questions:
6. **Home Examinations:** This type of exams will be conducted at home through sending an email to the students and they must answer the questions in a determined period or time, then all students must send their answers through the same email, such as the following questions:
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| **20. Extra notes:**If any student cannot make it to an in class exam due to a documentable reason, please let me know as soon as possible. Makeup will not be allowed for home works. However, I will double count students future graded assignments in the cases of excused absences.If you have any suggestions or concerns, either positive or negative, about this class, please do not hesitate to see me during my office hours or make an appointment. It is my hope that I will be able to resolve the issue. |
| **21. Peer review** Dr. Saman Husein MahmoudDr. Rizgar Magdid Ahmed |